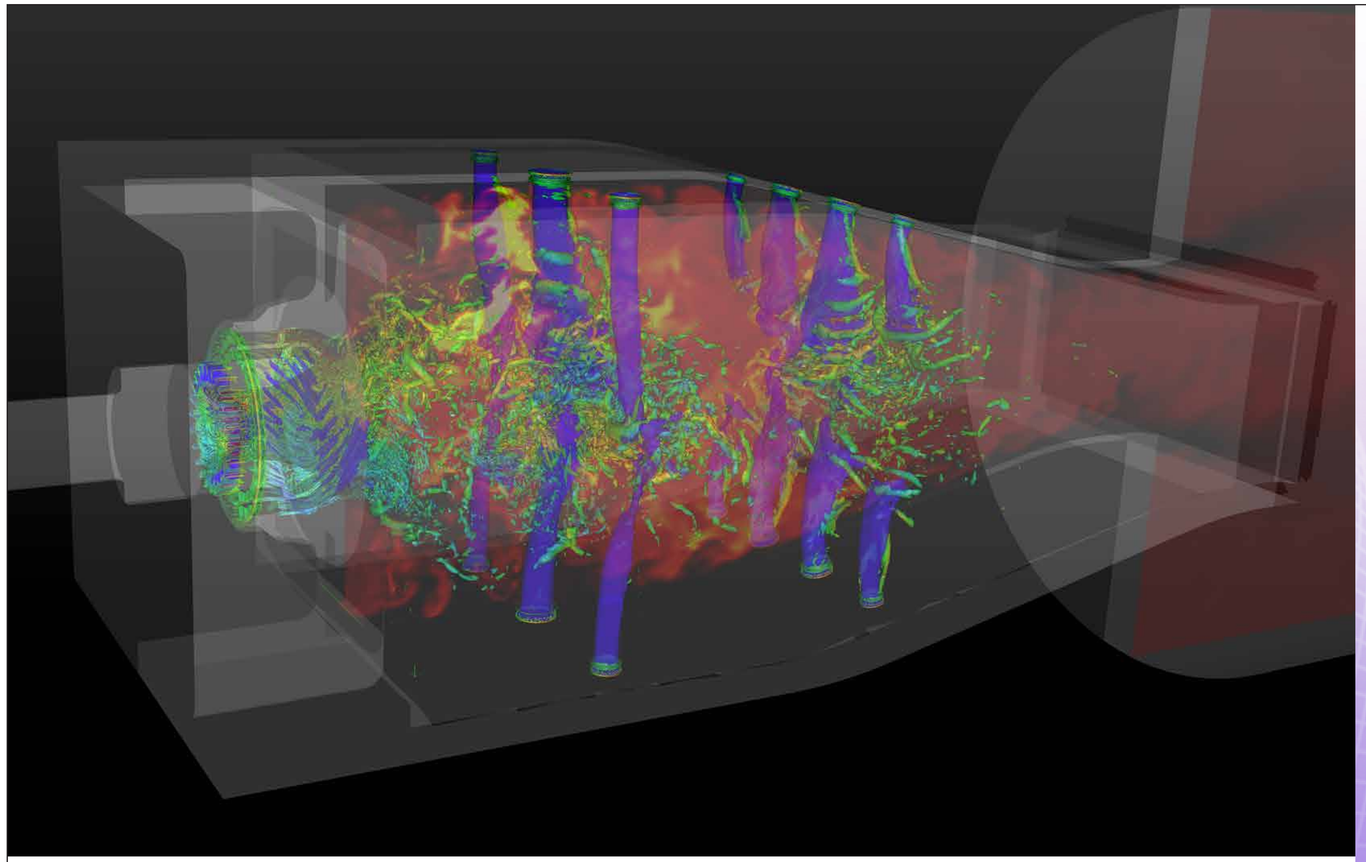
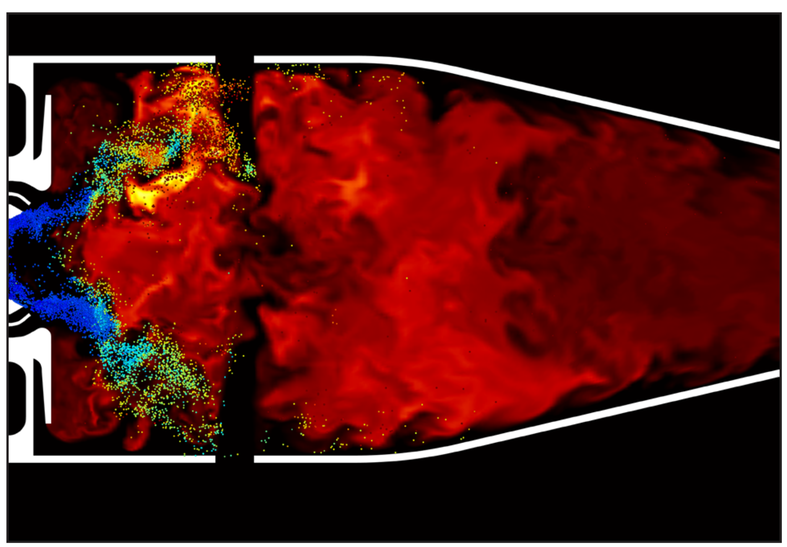


Snapshot of a jet engine combustor operating at conditions near the lean blowout limit, from a high-fidelity simulation run on the Pleiades supercomputer. Shown are three important characteristics of the jet engine: temperature within the combustion chamber (orange/red); dilution jets (violet; entering from the top and bottom), which cool down the combustion chamber; and the vortex structure (blue-green-yellow), which illustrates the complex turbulent structures present in the combustion chamber. *Jeffrey Labahn, Matthias Ihme, Stanford University*



Snapshot of a model jet engine simulation, highlighting the temperatures (black-red-yellow) within the combustion chamber and the liquid fuel droplets (small dots). This image shows the injection and subsequent breakup and evaporation of the liquid fuel. Following evaporation, the fuel vapor combusts, producing a lifted flame. The flame is stabilized due to the recirculation of hot gases in the center of the combustion chamber. *Jeffrey Labahn, Matthias Ihme, Stanford University*

National Aeronautics and Space Administration

Simulating Next-Generation Clean, Sustainable Jet Fuels

Modern jet engines are designed to be highly efficient while simultaneously limiting harmful emissions. Researchers are also working to develop new jet fuels that are renewable, sustainable, and can contribute toward the goal of achieving U.S. energy independence. However, the performance of these fuels must be carefully considered before they can be used in current or next-generation jet engines.

In partnership with NASA and the FAA, our team is developing state-of-the-art, multiphysics computer simulations and using them to investigate the behavior of new jet fuels and compare their performance to currently used fuels. These high-fidelity simulations determine the relative performance of new fuels at operating conditions near lean blowout, where the combustion process can be highly unstable.

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